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Bio-Surfactant Production and Its Application in Microbial EOR

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Abstract : There are various sources of energies available worldwide and among them, crude oil plays a vital role. Oil recovery is achieved using conventional primary and secondary recovery methods. In-order to recover the remaining residual oil, technologies like Enhanced Oil Recovery (EOR) are utilized which is also known as tertiary recovery. Among EOR, Microbial enhanced oil recovery (MEOR) is a technique which enables the improvement of oil recovery by injection of bio-surfactant produced by microorganisms. Bio-surfactant can retrieve unrecoverable oil from the cap rock which is held by high capillary force. Bio-surfactant is a surface active agent which can reduce the interfacial tension and reduce viscosity of oil and thereby oil can be recovered to the surface as the mobility of the oil is increased. Research in this area has shown promising results besides the method is echo-friendly and cost effective compared with other EOR techniques. In our research, on laboratory scale we produced bio-surfactant using the strain Pseudomonas putida (MTCC 2467) and injected into designed simple sand packed column which resembles actual petroleum reservoir. The experiment was conducted in order to determine the efficiency of produced bio-surfactant in oil recovery. The column was made of plastic material with 10 cm in length. The diameter was 2.5 cm. The column was packed with fine sand material. Sand was saturated with brine initially followed by oil saturation. Water flooding followed by bio-surfactant injection was done to determine the amount of oil recovered. Further, the injection of bio-surfactant volume was varied and checked how effectively oil recovery can be achieved. A comparative study was also done by injecting Triton X 100 which is one of the chemical surfactant. Since, bio-surfactant reduced surface and interfacial tension oil can be easily recovered from the porous sand packed column.

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